

Sub A1) 1. A computer-implemented method for generating a musical part from an electronic music file comprised of pitched instrumental parts, the method comprising:

generating a control stream that indicates which of the instrumental parts has a highest value for a period of time;

selecting one of the instrumental parts for the period of time based on the control stream; and

outputting the selected instrumental part for the period of time to produce the musical part.

2. The method of claim 1, wherein the control stream is generated by examining other periods of time defined by the electronic music file.

3. The method of claim 1, wherein the control stream is generated by comparing a contribution of one instrumental part for the period of time to a contribution of another instrumental part for the period of time.

4. The method of claim 3, wherein the control stream is generated based on a cost of switching between the one instrumental part and the other instrumental part.

5. The method of claim 1, wherein generating the control stream comprises:

obtaining measurement streams which include values for
5 corresponding instrumental parts; and

identifying an instrumental part in the measurement streams that has the highest value for the period of time.

6. The method of claim 5, wherein obtaining the
10 measurement streams includes analyzing aspects of the musical part.

7. The method of claim 6, wherein the aspects include
15 one or more of strum speed, average pitch, polyphony, loudness, and a vocal part.

8. The method of claim 5, wherein:
generating the control stream further comprises merging
the measurement streams to obtain a composite measurement
20 stream; and

the instrumental part in the measurement streams that has the highest value for the period of time is identified using the composite measurement stream.

5 9. The method of claim 1, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

10 10. The method of claim 1, further comprising:
repeating generating, selecting, and outputting for a second period of time that follows a first period of time;
wherein the musical part comprises the selected instrumental part for the first period of time and the selected instrumental part for the second period of time.

15 11. The method of claim 1, wherein each instrumental part comprises a stream of events, each event in the stream of events having a time stamp; and

20 the method further comprises changing time stamps of events that are within a predetermined time period of each other so that the time stamps are the same.

12. The method of claim 1, wherein generating is performed using a chooser object and selecting and outputting are performed using a switcher object.

5 13. A computer-implemented method for generating a musical part from an electronic music file, comprising:
identifying patterns in the electronic music file; and
selectively combining the patterns to produce the
musical part.

10 14. The method of claim 13, wherein the patterns comprise individual instrumental tracks in the electronic music file.

15 15. The method of claim 13, wherein selectively combining comprises:

selecting one of the patterns;
determining if a rhythmic complexity of the selected pattern exceeds a predetermined threshold; and

20 adding the selected pattern to the musical part if the rhythmic complexity of the selected pattern does not exceed the predetermined threshold.

16. The method of claim 15, further comprising discarding the selected pattern if the rhythmic complexity of the selected pattern exceeds the predetermined threshold.

17. The method of claim 15, wherein the rhythmic complexity of the selected pattern is determined based on musical features of the selected pattern.

18. The method of claim 17, wherein the musical features comprise one or more of a beat of the selected pattern, syncopated notes in the selected pattern, and proximity of notes in the selected pattern to other notes in the selected pattern.

19. The method of claim 13, wherein selectively combining comprises:

selecting one of the patterns;

determining if the selected pattern is similar to a pattern already in the musical part; and

adding the selected pattern to the musical part if the selected pattern is not similar to a pattern already in the musical part.

5 20. The method of claim 19, further comprising discarding the selected pattern if the selected pattern is similar to a pattern already in the musical part.

10 21. The method of claim 19, wherein determining is performed using a fuzzy comparison.

 22. The method of claim 19, wherein determining is performed using quantization.

15 23. The method of claim 13, wherein patterns having relatively low frequencies are combined to produce the musical part before patterns having relatively high frequencies are combined.

20 24. The method of claim 13, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

25. The method of claim 13, wherein the electronic music file is comprised of events; and

the method further comprises removing all but pre-specified events from the electronic music file prior to performing identifying and selectively combining.

26. A computer program stored on a computer-readable medium for generating a musical part from an electronic music file comprised of pitched instrumental parts, the computer program comprising instructions that cause a machine to:

generate a control stream that indicates which of the instrumental parts has a highest value for a period of time;

select one of the instrumental parts for the period of time based on the control stream; and

output the selected instrumental part for the period of time to produce the musical part.

27. The computer program of claim 26, wherein the control stream is generated by examining other periods of time defined by the electronic music file.

28. The computer program of claim 26, wherein the control stream is generated by comparing a contribution of one instrumental part for the period of time to a
5 contribution of another instrumental part for the period of time.

29. The computer program of claim 28, wherein the control stream is generated based on a cost of switching
10 between the one instrumental part and the other instrumental part.

30. The computer program of claim 26, wherein generating the control stream comprises:

15 obtaining measurement streams which include values for corresponding instrumental parts; and

identifying an instrumental part in the measurement streams that has the highest value for the period of time.

20 31. The computer program of claim 30, wherein obtaining the measurement streams includes analyzing aspects of the musical part.

32. The computer program of claim 31, wherein the aspects include one or more of strum speed, average pitch, polyphony, loudness, and a vocal part.

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33. The computer program of claim 30, wherein:
generating the control stream further comprises merging the measurement streams to obtain a composite measurement stream; and

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the instrumental part in the measurement streams that has the highest value for the period of time is identified using the composite measurement stream.

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34. The computer program of claim 26, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

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35. The computer program of claim 26, further comprising instructions that cause the machine to:
repeat generating, selecting, and outputting for a second period of time that follows a first period of time;

wherein the musical part comprises the selected instrumental part for the first period of time and the selected instrumental part for the second period of time.

5 36. The computer program of claim 26, wherein each instrumental part comprises a stream of events, each event in the stream of events having a time stamp; and

10 the computer program further comprises instructions that cause the machine to change time stamps of events that are within a predetermined time period of each other so that the time stamps are the same.

15 37. The computer program of claim 26, wherein generating is performed using a chooser object and selecting and outputting are performed using a switcher object.

20 38. A computer program stored on a computer-readable medium for generating a musical part from an electronic music file, the computer program comprising instructions that cause a machine to:

identify patterns in the electronic music file; and

selectively combine the patterns to produce the musical part.

39. The computer program of claim 38, wherein the
5 patterns comprise individual instrumental tracks in the electronic music file.

40. The computer program of claim 38, wherein
selectively combining comprises:

10 selecting one of the patterns;

determining if a rhythmic complexity of the selected pattern exceeds a predetermined threshold; and

15 adding the selected pattern to the musical part if the rhythmic complexity of the selected pattern does not exceed the predetermined threshold.

41. The computer program of claim 40, further
comprising instructions that cause the machine to discard
the selected pattern if the rhythmic complexity of the
20 selected pattern exceeds the predetermined threshold.

42. The computer program of claim 40, wherein the rhythmic complexity of the selected pattern is determined based on musical features of the selected pattern.

5 43. The computer program of claim 42, wherein the musical features comprise one or more of a beat of the selected pattern, syncopated notes in the selected pattern, and proximity of notes in the selected pattern to other notes in the selected pattern.

10 44. The computer program of claim 38, wherein selectively combining comprises:

selecting one of the patterns;

15 determining if the selected pattern is similar to a pattern already in the musical part; and

adding the selected pattern to the musical part if the selected pattern is not similar to a pattern already in the musical part.

45. The computer program of claim 44, further comprising instructions that cause the machine to discard the selected pattern if the selected pattern is similar to a pattern already in the musical part.

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46. The computer program of claim 44, wherein determining is performed using a fuzzy comparison.

47. The computer program of claim 44, wherein determining is performed using quantization.

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48. The computer program of claim 38, wherein patterns having relatively low frequencies are combined to produce the musical part before patterns having relatively high frequencies are combined.

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49. The computer program of claim 38, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

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50. The computer program of claim 38, wherein the electronic music file is comprised of events; and

the computer program further comprises instructions that cause the machine to remove all but pre-specified events from the electronic music file prior to performing identifying and selectively combining.

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51. An apparatus for generating a musical part from an electronic music file comprised of pitched instrumental parts, the apparatus comprising:

a memory that stores executable instructions; and

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a processor that executes the instructions to:

generate a control stream that indicates which of the instrumental parts has a highest value for a period of time;

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select one of the instrumental parts for the period of time based on the control stream; and

output the selected instrumental part for the period of time to produce the musical part.

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52. The apparatus of claim 51, wherein the control stream is generated by examining other periods of time defined by the electronic music file.

53. The apparatus of claim 51, wherein the control stream is generated by comparing a contribution of one instrumental part for the period of time to a contribution of another instrumental part for the period of time.

54. The apparatus of claim 53, wherein the control stream is generated based on a cost of switching between the one instrumental part and the other instrumental part.

55. The apparatus of claim 51, wherein generating the control stream comprises:

obtaining measurement streams which include values for corresponding instrumental parts; and

identifying an instrumental part in the measurement streams that has the highest value for the period of time.

56. The apparatus of claim 55, wherein obtaining the measurement streams includes analyzing aspects of the musical part.

57. The apparatus of claim 56, wherein the aspects include one or more of strum speed, average pitch, polyphony, loudness, and a vocal part.

5 58. The apparatus of claim 55, wherein:
generating the control stream further comprises merging the measurement streams to obtain a composite measurement stream; and

10 the instrumental part in the measurement streams that has the highest value for the period of time is identified using the composite measurement stream.

15 59. The apparatus of claim 51, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

20 60. The apparatus of claim 51, wherein:
the processor executes instructions to repeat generating, selecting, and outputting for a second period of time that follows a first period of time; and

the musical part comprises the selected instrumental part for the first period of time and the selected instrumental part for the second period of time.

5 61. The apparatus of claim 51, wherein:
each instrumental part comprises a stream of events,
each event in the stream of events having a time stamp; and
the processor executes instructions to change time
10 stamps of events that are within a predetermined time period
of each other so that the time stamps are the same.

15 62. The apparatus of claim 51, wherein generating is
performed using a chooser object and selecting and
outputting are performed using a switcher object.

20 63. An apparatus for generating a musical part from an
electronic music file, comprising:

a memory that stores executable instructions; and
a processor that executes the instructions to:

identify patterns in the electronic music file;
and

selectively combine the patterns to produce the musical part.

64. The apparatus of claim 63, wherein the patterns
5 comprise individual instrumental tracks in the electronic music file.

65. The apparatus of claim 63, wherein selectively combining comprises:

10 selecting one of the patterns;

determining if a rhythmic complexity of the selected pattern exceeds a predetermined threshold; and

15 adding the selected pattern to the musical part if the rhythmic complexity of the selected pattern does not exceed the predetermined threshold.

20 66. The apparatus of claim 65, wherein the processor executes instructions to discard the selected pattern if the rhythmic complexity of the selected pattern exceeds the predetermined threshold.

67. The apparatus of claim 65, wherein the rhythmic complexity of the selected pattern is determined based on musical features of the selected pattern.

5 68. The apparatus of claim 67; wherein the musical features comprise one or more of a beat of the selected pattern, syncopated notes in the selected pattern, and proximity of notes in the selected pattern to other notes in the selected pattern.

10 69. The apparatus of claim 63, wherein selectively combining comprises:

selecting one of the patterns;

15 determining if the selected pattern is similar to a pattern already in the musical part; and

adding the selected pattern to the musical part if the selected pattern is not similar to a pattern already in the musical part.

70. The apparatus of claim 69, wherein the processor executes instructions to discard the selected pattern if the selected pattern is similar to a pattern already in the musical part.

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71. The apparatus of claim 69, wherein determining is performed using a fuzzy comparison.

72. The apparatus of claim 69, wherein determining is performed using quantization.

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73. The apparatus of claim 63, wherein patterns having relatively low frequencies are combined to produce the musical part before patterns having relatively high frequencies are combined.

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74. The apparatus of claim 63, wherein the electronic music file comprises a Musical Instrument Digital Interface (MIDI) file.

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75. The apparatus of claim 63, wherein:
the electronic music file is comprised of events; and
the processor executes instructions to remove all but
pre-specified events from the electronic music file prior to
5 performing identifying and selectively combining.